CHAPTER 4: TRANSPORTATION AND LAND USE SCENARIOS

The Ballard-Interbay Regional Transportation System (BIRT) study undertook a scenario planning exercise to develop an understanding of how different potential futures are related to bridge alternatives, land use changes, and transportation investments inform BIRT recommendations. This chapter discusses 4 scenarios for the planning year 2042, and their 3 key elements. It includes a summary of: (1) the scenarios and how future land use and transportation assumptions were used to inform BIRT recommendations and (2) how specific projects were identified and evaluated.

Based on future needs identified by the scenario evaluation and current needs identified by the BIRT needs evaluation (Chapter 3), a comprehensive list of potential projects was developed. This list included recommendations from previous plans, as well as partner agency, stakeholder, and public input (Chapter 2 and Appendices A, B, and D). Projects were evaluated and prioritized based on a set of evaluation criteria, aligned with the project goals described in Chapter 1.

Planned development of the Terminal 91 Uplands is one of the future land uses considered in BIRT scenario planning

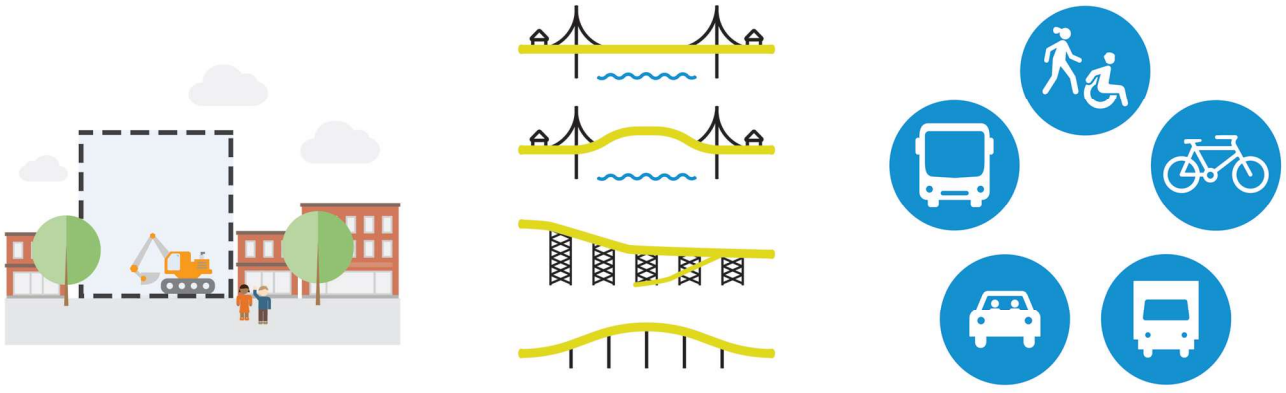
FUTURE LAND USE AND TRANSPORTATION SCENARIOS

The BIRT study evaluated 4 scenarios to anticipate different potential outcomes by 2042, considering elements such as transportation system, bridge alternatives, and land use. Planned changes to the transportation system and proposals under consideration for future land redevelopment influence the need for additional transportation investments. Beyond these certainties, there are many land use and redevelopment considerations that could influence transportation system needs between today and the planning horizon year of 2042. The scenario evaluation ensures that realistic future outcomes are considered and addressed by proposed investments.

Scenario Elements

Each of the 2042 scenarios were built around combinations of the following elements:

FIGURE 4-1: SCENARIO ELEMENTS



Land Use
Potential scenarios for development or redevelopment of parcels in the study area

Bridge Alternatives
Alternatives for replacement of the Ballard Bridge and Magnolia Bridge

Transportation System
Multimodal transportation system projects and operations

The BIRT study does not recommend a single preferred bridge alternative for either the Ballard or Magnolia bridges, but evaluates future transportation system improvements based on potential replacement alternatives.

A current year (2019) scenario was developed and evaluated to provide a baseline and ensure travel demand models are calibrated to current system operations. Models were calibrated to 2019 conditions given the abnormal traffic conditions experienced in 2020 due to the COVID-19 pandemic and its impacts to regional travel demand and economic activity.

Land Use and Transportation Scenarios

All of the scenarios considered regional growth through 2042 and the mobility benefits of long-term investments such as Sound Transit's Ballard Link Extensions and implementation of the City's modal plans. The alternatives varied in their assumptions for the replacement alternatives selected for the Magnolia and Ballard bridges, as well as land uses permitted in the City's industrial zones. Scenarios 1 and 2 are consistent with Comprehensive Plan land use projections. Scenarios 3 and 4 envision higher zoning or land use intensity associated largely with the Armory site redevelopment. Magnolia and Ballard bridge alternatives are born out of the recent bridge studies completed in 2019 and 2020, respectively. A total of 4 land use and transportation scenarios were considered for this study.

TABLE 4-1: LAND USE , BRIDGE, AND TRANSPORTATION SCENARIOS

Element	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Land Use	A Maintain Industrial Character	A Maintain Industrial Character	B Future of Industry	C Transition to Mixed Use District
Ballard Bridge	 Ballard Bridge Mid-Level	 Ballard Bridge Low-Level	 Ballard Bridge Low-Level	 Ballard Bridge Low-Level
Magnolia Bridge	 Magnolia Bridge In-Kind Replacement	 New Armory Way Bridge	 New Armory Way Bridge	 New Armory Way Bridge
Transportation Infrastructure	 Transportation Investments	 Transportation Investments	 Transportation Investments	 Transportation Investments

Scenarios 1 and 2 test differences in the Magnolia and Ballard Bridge configurations with the same land use assumptions in place. The land use tested in Scenarios 1 and 2 is most similar to what current zoning would support. Scenarios 3 and 4 utilize the bridge alternatives assumed to have the greatest impact on the transportation system. These scenarios are used to evaluate impacts of potential future housing, employment, and land use growth. The proposed land use scenarios from the Mayor's Maritime & Industrial Strategy (M&I) were used to model traffic and potential growth intensities in Ballard-Interbay. The M&I inputs were provided before that process was complete so should be considered representative.

Scenario Performance

Specific high-level measures of effectiveness were derived from the BIRT study goals and scored for each scenario to understand which provide the most benefits in terms of mobility, safety, equity, and potential for action. Table 4-2 shows the scores, ranging from a blank circle showing low performance, to a full circle for high performance. A No Build scenario is included for comparison, which represents a scenario where no specific BIRT-related projects are constructed. As shown below, Scenarios 2, 3, and 4 provide the greatest multimodal transportation benefit, all of which incorporate a low-level Ballard Bridge and new Armory Way bridge.

TABLE 4-2: COMPARISON OF PERFORMANCE BY SCENARIO

Category	Element: *Metric Considered*	No Build	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Mobility	Motorized Modes (Bus, Freight, Auto): *Travel time*					
	Active Modes (Walking and Biking): *Pedestrian/ bicyclist comfort*					
Safety	Safe and Comfortable Options: *Addresses high-collision locations*					
Equity	Social Impacts: *Provides amenities to low-income communities and people of color*					
Action	Transportation Capital Costs: *Overall cost of capital projects (best performance = lowest cost)*					
	Response to Urgent Needs: *Rebuilds deficient facility*					

 = Lowest performance  = High performance

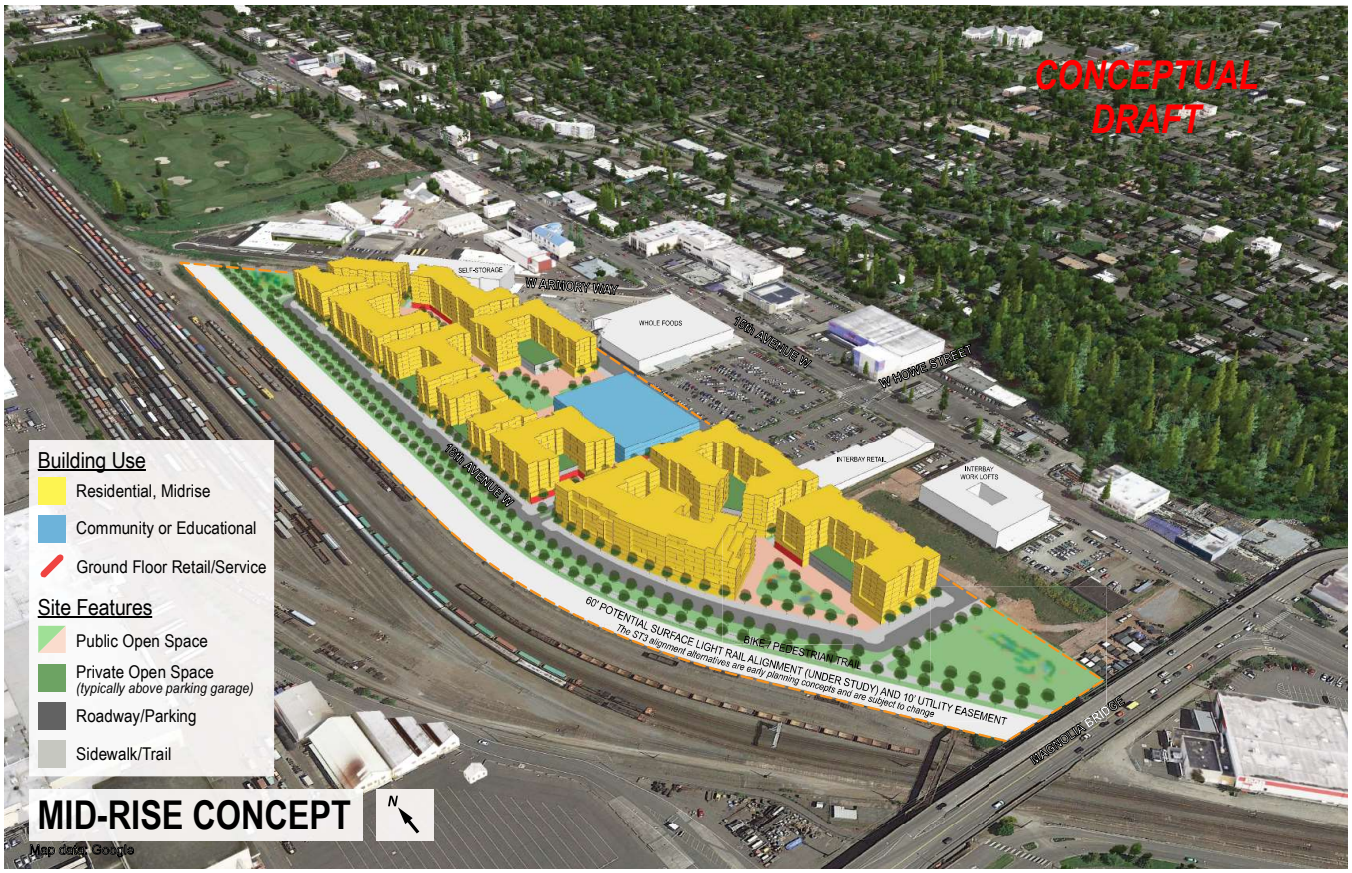
Figure 4-2 provides a high-level summary of scenarios based on measures of effectiveness that align with project goals. A more detailed evaluation of projects was conducted and is described later in this chapter.

Land Use Alternatives

The land uses considered in this study are informed by alternatives analysis being conducted as part of the Mayor's Maritime & Industrial Study (M&I). The M&I was in progress at time of this work, so land use inputs were not final; rather the team used assumptions that represented ranges of growth and intensity. It is important for the BIRT study to test more aggressive future land uses to ensure plan priorities account for the potential impacts to the transportation system those may generate. No decisions about changes to zoning in the study have been made to support these conceptual scenarios. These land use alternatives have similar foundational elements. The Armory site redevelopment scenarios are a primary variable among land uses considered. The Department of Commerce worked with the Washington State Military (National Guard) and an advisory board including elected officials to evaluate potential future uses of the Interbay Property per legislative direction in 2018.[1]

Table 4-3 provides additional detail on the land use scenarios mentioned in Table 4-1.

FIGURE 4-2: ARMORY SITE MID-RISE REDEVELOPMENT CONCEPT



Potential changes to land use at the Armory site could represent the most significant changes to land use in the study area. No changes to current zoning (required for this redevelopment concept) have been made by the City of Seattle at the time of this study and all assumptions about this site used in the BIRT study are for purpose of understanding the impact that more intense uses of the site could have on the transportation network.

1 https://deptofcommerce.app.box.com/v/Interbay-plan

Table 4-3 describes the 3 land use scenarios considered within the BIRT study. All 3 future year scenarios look out to 2042 and assume regional land use growth consistent with that forecast in the Puget Sound Regional Council travel model applied for the West Seattle and Ballard Link Extensions Project. All 3 scenarios also assume the following key developments within the BIRT study area:

- Terminal 91 Uplands: Phase I development in the Port of Seattle's Terminal 91 Uplands over the next 10-15 years will consist of approximately 100,000 square feet of light industrial space and associated site infrastructure improvements, with phase II developing another 300,000 square feet of light industrial facilities.
- Fishermen's Terminal: The Port of Seattle's Fishermen's Terminal redevelopment (2019-2023) will include roughly 60,000 square feet of new light industrial space for complementary maritime businesses by the end of 2022. A new "Gateway" building is planned in the existing vacant bank building and Net Sheds 7 and 8.
- Expedia Site: The Expedia Site will accommodate 8,000 employees by 2031.

The 3 land use scenarios differ in their assumed development of the City's Maritime and Industrial Zones and assumptions about redevelopment of the Armory site. These assumptions were developed in coordination with upcoming M&I Study (Mayor's Office, expected 2021) and The Interbay Public Development Advisory Committee's Recommendations and Implementation Plan (Department of Commerce, 2018). The last 3 rows of Table 4-3 will continue to evolve and be informed by the Mayor's M&I strategy work.

TABLE 4-3: FUTURE LAND USE ALTERNATIVES

Alternative	Land Use A: Maintain Industrial Character	Land Use B: Future of Industry	Land Use C: Transition to Mixed Use District
	A	B	C
Regional Land Use	Scenarios include land use growth assumptions adopted by the City of Seattle (Seattle 2035: Comprehensive Plan) and included in the Puget Sound Regional Council land use forecast.		
Site Specific Development	Terminal 91 Uplands: Phase I development in the Port of Seattle's Terminal 91 Uplands over the next 10-15 years will consist of approximately 100,000 square feet of light industrial space and associated site infrastructure improvements, with phase II developing another 300,000 square feet of light industrial facilities.		
	Fishermen's Terminal: The Port of Seattle's Fishermen's Terminal redevelopment (2019-2023) will include roughly 60,000 square feet of new light industrial space for complementary maritime businesses by the end of 2023. A new "Gateway" building is planned in the existing vacant bank building and Net Sheds 7 and 8. Redevelopment includes a new Gateway and Maritime Innovation Center.		
	Expedia Site: The Expedia Site may accommodate up to 8,000 employees by 2031.		
	Armory Site: Assumes a mid-point of the Armory site development concepts, similar to the 'Mid-Rise' concept which includes 1,800 new units of multifamily housing and 102,000 SF of retail space by 2035. No decisions have been made about the Armory site redevelopment. Land use alternatives are based upon conceptual zoning and land use scenarios.		Armory Site: Assumes Armory Development 'High-Rise' concept which includes dense high-rise multi-family residential, retail, and civic space. The proposed Armory site will include 2,900 new dwelling units and 110,000 SF of retail space by 2035.
Industrial and Maritime Zones	Industry and Maritime: No change in industrial zoning	Industry and Innovation: Greater mix of production, research, design, and industrial office uses Makers Zone: Mix of small-scale industrial firms and incubator and prototyping activity	Mixed Use: Allows dense multi-family housing and expanded opportunities for retail and office space
	Housing: No new housing assumed within industrial zones	Housing: No new housing assumed within industrial zones	Housing: 1:1 job to housing ratio within targeted industrial zones
	Employment: No change in employment assumed within industrial zones	Employment: 27% growth in employment in targeted industrial zones	Employment: 6% growth in employment in targeted industrial zones

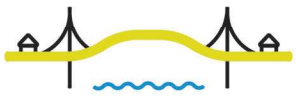
Bridge Alternatives

Each scenario incorporates 1 of 2 bridge alternatives for the Ballard Bridge (low-level and mid-level) and 1 of 2 for the Magnolia Bridge (in-kind replacement of the existing bridge and a new bridge on Armory Way that replaces the current bridge). Bridge alternatives were developed through the Ballard and Magnolia Bridge Planning Studies. Each of those studies evaluated a range of alternatives; BIRT evaluates the 2 most viable and publicly supported alternatives from each study. Bridge alternatives provide varying access to and from the Ballard Bridge, the Magnolia neighborhood, and 15th Ave W/NW.

Ballard Bridge Alternatives

Figure 4-3 shows the alignment and describes the features of the mid-level Ballard Bridge alternative. Figure 4-4 shows the alignment and describes the features of the low-level bridge alternative.

FIGURE 4-3: MID-LEVEL BALLARD BRIDGE ALTERNATIVE

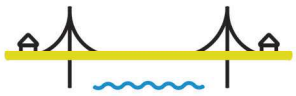


Ballard Bridge Mid-Level

The Ballard Bridge mid-level alternative, which is assumed in Scenario 1, would replace the existing structure and re-design access to and from the bridge on the northern and southern ends to enhance freight mobility. It is a lift bridge with less need to open than today.

1. Northbound off-ramp at NW 49th St on the east side
2. Southbound on-ramp from 17th Ave NW & NW Leary Way; 2 new signals at 17th Ave NW at Leary Way
3. Shared-use path for people biking, walking, and rolling
4. Longer on and off ramps from 15th Ave W on the southern end of the bridge
5. W Nickerson/W Emerson St will include a modified single point urban interchange (SPUI)

FIGURE 4-4: LOW-LEVEL BALLARD BRIDGE ALTERNATIVE



Ballard Bridge Low-Level

The Ballard Bridge low-level alternative in Scenarios 2, 3, and 4 will be similar to the existing bridge but will include improved access for all modes at the south landing. It is a lift bridge with need to open similar to today.

1. Similar access on northern section as with baseline conditions
2. Shared-use path for people biking, walking, and rolling
3. Enhanced access on southern section
4. W Nickerson/W Emerson St will include a modified single point urban interchange (SPUI)

Magnolia Bridge Alternatives

Figure 4-5 describes the Magnolia Bridge in-kind replacement and Figure 4-6 shows the proposed Armory Way bridge and associated network improvements.

FIGURE 4-5: MAGNOLIA BRIDGE IN-KIND REPLACEMENT

Magnolia Bridge In-Kind Replacement

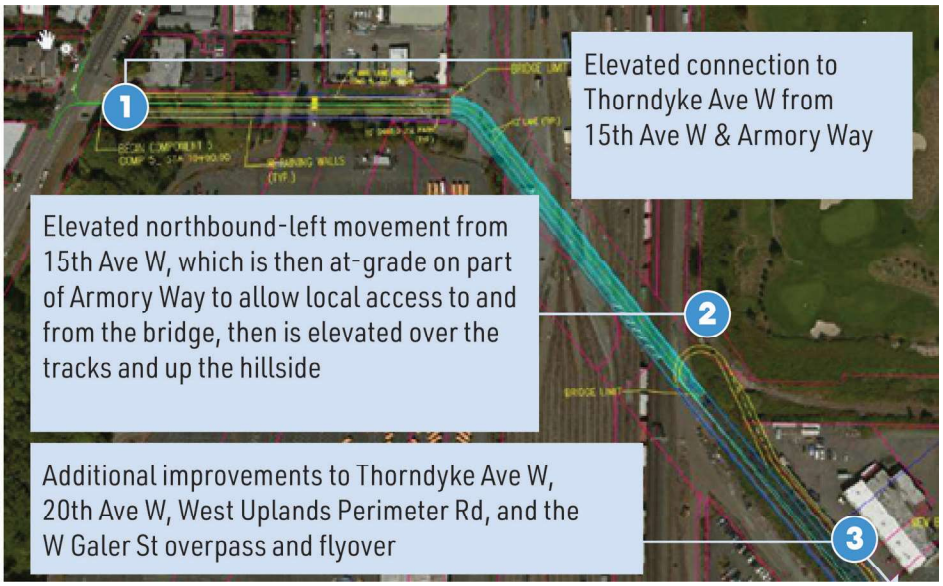
Scenario 1 considers a one-to-one replacement of the Magnolia Bridge.

1. New bridge built immediately south of existing Magnolia Bridge
2. Connections at the east and west would be similar to existing bridge

FIGURE 4-6: ARMORY WAY BRIDGE

Armory Way Bridge

The other 3 scenarios assume a new bridge along Armory Way, which would replace the existing Magnolia Bridge.



Transportation Investments

In addition to the bridge replacement alternatives, other key transportation infrastructure and network assumptions included in the scenarios are:

- Sound Transit West Seattle and Ballard Link Extensions (WSBLE)
- King County METRO CONNECTS 2040 Network
- Bike Master Plan project completion
- Freight Master Plan project completion

Sound Transit West Seattle and Ballard Link Extensions

The most transformational change expected for the BIRT study area in the next 20 years is the arrival of Link light rail, which will serve 3 study area stations: Ballard, Interbay, and Smith Cove.

King County METRO CONNECTS 2040 Network

As a result of the WSBLE project, King County Metro anticipates major changes to the bus network that restructures service to enhance bus connections to light rail and other regional centers. Metro's 2040 METRO CONNECTS network is consistent with Scenario 1 (Magnolia Bridge in-kind replacement) since no changes to the transit environment would be made. Scenarios 2 through 4 (Armory Way bridge alternative) assumes all transit using the Magnolia Bridge in the baseline/Scenario 1 network would shift to Armory Way and use W Thorndyke Ave to access the various transit pathways.

Bicycle Master Plan

The City of Seattle's adopted 2014 Bicycle Master Plan (BMP) outlines proposed improvements to the City's bicycle network. Although the plan has a 20-year horizon, implementation is dependent on funding availability. The most relevant projects for Ballard that have not yet been implemented include:

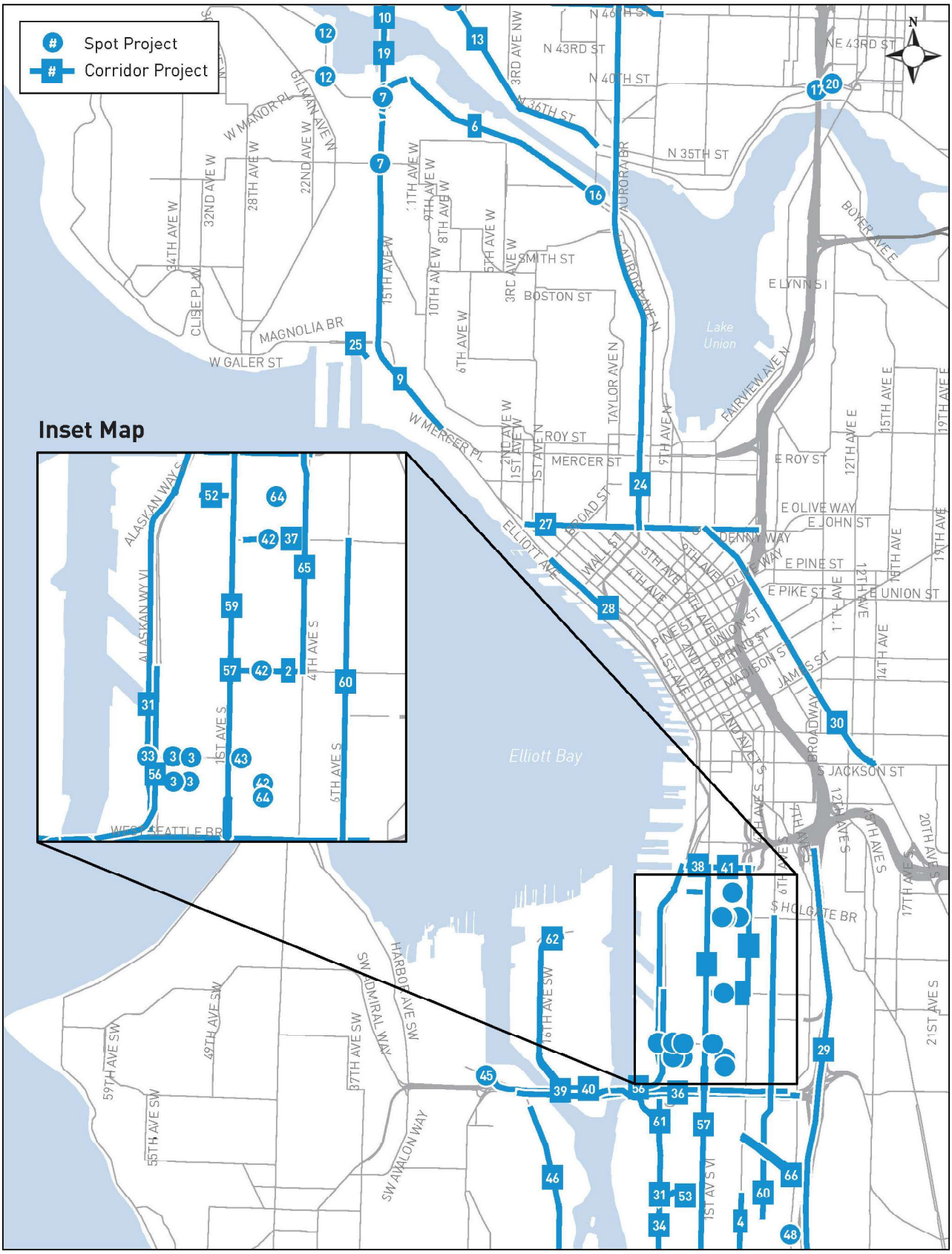
- Complete the missing link of the Burke-Gilman Trail (planned start of construction is 2022)
- Provide a shared-use path on the new Ballard Bridge*
- Add bicycle lanes on 14th Ave NW and 32nd Ave NW*
- Create a variety of neighborhood greenways that are oriented both north-south and east-west, providing additional route options*
- Build an additional Ship Canal bicycle-pedestrian crossing between the Ballard and Fremont bridges to provide a new connection between the Burke-Gilman Trail and Ship Canal Trail, though the BMP doesn't specify an exact location*

**Unfunded project as of 2020*

Freight Master Plan

The City adopted its first Freight Master Plan in September 2016. The plan directs the City to maintain primary and secondary freight routes, including those connecting Interbay to the regional freeway network. A map from the 2016 plan illustrated in Figure 4-7 shows key projects and corridors in Central Seattle. None of the future scenarios assume the freight network changes meaningfully beyond what currently exists since there is limited right-of-way and land to create new freight network connections.

FIGURE 4-7: CENTRAL SEATTLE FREIGHT PROJECTS (2016 FREIGHT MASTER PLAN)



Specific project details can be found in the Seattle Freight Master Plan: https://www.seattle.gov/Documents/Departments/SDOT/About/DocumentLibrary/FMP_Report_2016E.pdf

PROJECT IDENTIFICATION AND EVALUATION

The study identifies project-level improvements that are location- or corridor-specific and support the modal networks that keep people and goods moving in the study area. This comprehensive list of potential improvements was developed based on the review of documented needs and recommendations from previous plans, the BIRT needs assessment (Chapter 3), as well as partner agency, stakeholder, and public input (Chapter 2 and Appendices A, B, and D). Projects were evaluated based on a set of evaluation criteria aligned with the project goals (Chapter 1).

Projects identified in this study aim to improve one or more of these forms of transportation ...

Walking and rolling | **Bicycling** | **Transit** | **Freight and goods movement** | **Auto and taxi/ridehail**

Evaluation Framework

A project evaluation framework was developed to identify the projects and that best support the legislative directive for the project, SDOT's goals and values, and the interests of the interagency team and study area communities. The following framework was developed with public and Interagency Team input. Each project was evaluated based on the full set of criteria. A complete list of projects and their scores per metric is included in Appendix G, and detailed recommendations resulting from the technical evaluation and public input are provided in Chapter 6.

GOAL 1: MOBILITY

Improve mobility for people and freight

Objective 1: Increase person mobility in the study area

METRICS AND EVALUATION CRITERIA

- **Throughput:** Project increases person trips and person throughput.
- **Transit Mobility:** Project improves transit mobility.
- **Access:** Project increases the geographic reach for walking or biking to key destinations (light rail station, existing RapidRide, local, and express bus stops, or major jobs center [Terminal 91, Expedia, Armory]) under low-stress conditions.
- **Connectivity:** Project increases the number of high-quality travel choices through improved connectivity.

Objective 2: Accommodate the needs of freight and goods movement

METRICS AND EVALUATION CRITERIA

- **Travel Time and Reliability:** Project reduces or maintains freight travel times on key corridors.
- **Route Resiliency:** Project adds to available freight paths at key locations in the study area.

GOAL 2: SAFETY

Provide a system that safely accommodates all travelers

Objective 1: Protect the most vulnerable travelers

METRICS AND EVALUATION CRITERIA

- **Safe and Comfortable Options:** Project makes walking, rolling, biking, and using transit safer and more comfortable.
- **Crossing Safety:** Project makes crossing roadways safer and more comfortable for those walking, rolling, biking, and accessing transit.
- **Collision Histories and Factors:** Project addresses safety at a location where many collisions have occurred or are identified in the City's Bicycle and Pedestrian Safety Analysis.

Objective 2: Recognize the unique needs to safely accommodate freight

METRICS AND EVALUATION CRITERIA

- **Roadway Geometrics:** Project improves mobility for trucks and deliveries.
- **Modal Separation:** Project limits conflicts with other modes.

GOAL 3: EQUITY

Advance projects that meet the needs of communities of color and those of all incomes, abilities, and ages

Objective 1: Build a more racially equitable and socially just transportation system

METRICS AND EVALUATION CRITERIA

- **Social Impacts - Residents:** Project minimizes impacts on people of color and low-income households that live in the BIRT study area.
- **Social Impacts - Employees:** Project minimizes impacts on low-wage workers and people of color that work in the BIRT study area.
- **Americans with Disabilities Act (ADA) Access:** Project makes it easier for people with disabilities to travel in the study area.

GOAL 4: ACTION

Support timely and coordinated implementation

Objective1: Maintain the current and future capacities of the Ballard and Magnolia bridges

Objective 2: Provide other necessary infrastructure in Ballard-Interbay to facilitate overall mobility

METRICS AND EVALUATION CRITERIA

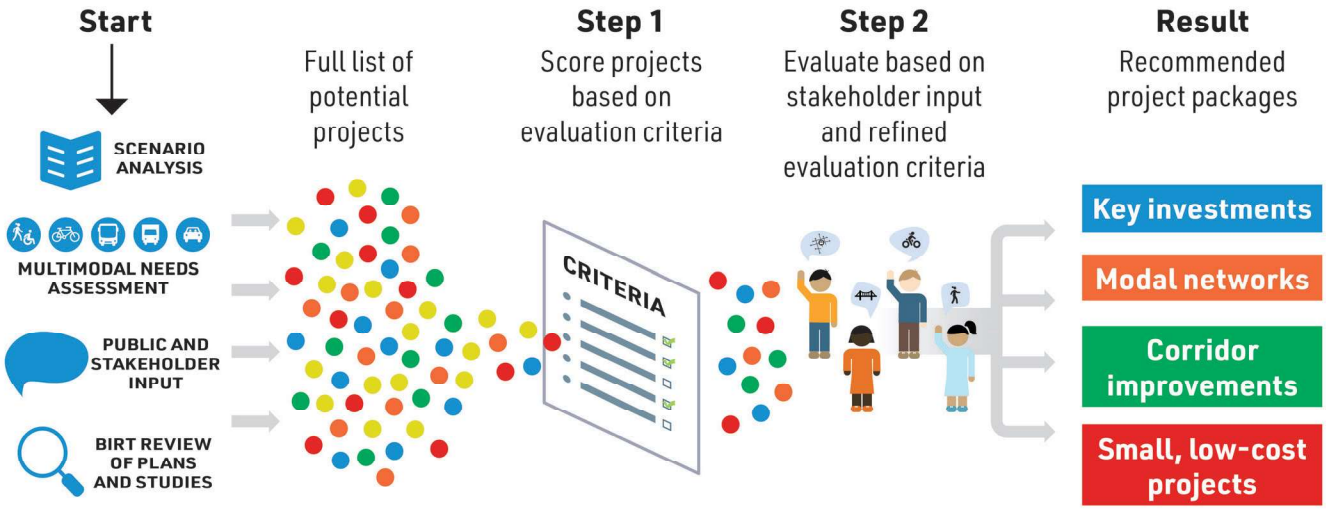
- **Timely Implementation:** Project is implementable within a reasonable timeframe given technical and right-of-way considerations.
- **Constructability, Risk, and Complexity:** Project limits construction impacts.
- **Environmental Impacts:** Project minimizes impacts on the ecological environment.
- **Economic Impacts:** Project supports the Manufacturing and Industrial Center (BINMIC) and maritime industries.
- **Responds to Urgent Needs:** Project addresses an identified seismic or structural deficiency.
- **Funding Viability:** Project is likely to be funded through local, regional, state, or federal funding.[2]

2 Funding viability means a project has earmarked funds, is competitive for grant funding, or can be included as part of another City-funded project or program.

Project Identification

The 4 land use and transportation scenarios, review of previous plans and studies, public engagement, and an extensive needs assessment conducted during this study were used to identify modal needs, resulting in more than 80 individual projects for evaluation. Projects were evaluated and scored based upon the evaluation criteria described on pages 61-62, and were further refined with agency and stakeholder input as shown in Figure 4-8.

FIGURE 4-8: PROJECT IDENTIFICATION PROCESS



The initial project scoring resulted in about 50 projects being advanced for further evaluation. Additional stakeholder input and refinement of the evaluation criteria brought the list down to about 40 top projects. These projects were categorized and prioritized based on how they would improve the transportation system under different scenarios. The top rated projects are described in more detail in Chapter 6: Potential Transportation Investments. Many of the highest-scoring projects are applicable with any of the proposed bridge alternatives. For those projects that are only viable with specific bridge alternatives, those dependencies are highlighted.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